

CLAIMS AS TO PATENT

1. A device (12) to pick up at least one disc-shaped semi-conductor wafer (11) from a container (14) of such wafers on one side (15) of an aperture (13) in the transfer station (10) of a semi-conductor wafer processing plant, the device being situated in the space (16) on the opposite side (17) of the said aperture. The device incorporates:

- A moving shutter (1) designed to move between a first, closed aperture, position and a second, open aperture, position allowing access to the interior of the container,
- A means of moving (18) this shutter between these first and second positions, the said movement taking place, at least in part, in a plane approximately parallel to the plane of the aperture.

The said device is *identifiable in that* it incorporates:

- Some means of picking up (2) at least one semi-conductor wafer (11) by partially entering the container below a wafer and then picking up the wafer by its rim,
- Some means of moving (3) the said pick-ups between the space on the second side of the aperture and the first side, and back again,
- Some means of linking (4) the said shutter with the said pick-up mechanism.

2. A device according to Claim 1, *identifiable in that* it incorporates some means of orienting (20) the said semi-conductor wafer(s) in coordination with the pick-ups (2) and the pick-up mechanism (3) allowing the orientation of the said semi-conductor wafer(s) to be changed.

3. A device according to Claims 1 or 2, *identifiable in that* the said mechanism (3) to move the pick-up's (2) between the space (16) on the second side (17) of the aperture (13) to the first side (15), and back again, incorporates some means of transferring a semi-conductor wafer (11) from one side of the aperture (13) to the other side.

4. A device according to any of Claims 1 to 3, *identifiable in that* the said pick-ups (2) incorporate a first (6) and second (7) moving arms designed to adopt an initial position in which they lie approximately parallel and a second position in which they form a specific angle (α) to one another such that they form a flat, supporting surface for the semi-conductor wafer (11).

5. A device according to Claim 4, *identifiable in that* the said wafer pick-ups (2) incorporate at least three rollers (21) attached to three extremities of the said first (6) and second (7) arms by means of a freely-rotating attachment such that the said three or more rollers are divided around the semi-conductor wafer (11) when the first and second arms are in their said second moving arm position.

6. A device according to Claims 4 or 5, *identifiable in that* the said first (6) and second (7) moving arms lie in a plane approximately parallel with the plane of the aperture when in their initial moving arm position and in a plane at right angles to the plane of the aperture when they are in their second moving arm position.

7. A device according to any of Claims 1 to 6, *identifiable in that* the means of moving the said pick-ups between the space on the second side (17) of the aperture (13) and the first side (15) where the container is located, and back again, incorporates a third arm (8) carrying the said pick-ups (2) at one of its ends (22), and in that the means of attaching (4) the pick ups' mechanism (3) to the shutter (1) includes a joint (23) between the third arm and the shutter at its other end (24) such that the pick-ups can move from one part of the aperture (13) to the other.

8. A device according to Claims 4 and 7, *identifiable in that* the said first (6), second (7) and third (8) arms are jointed together such that they can be moved in coordination with the joint (23) between the third arm and the shutter in a plane at right angles to that of the said aperture, and in that the pick-ups' (2) mechanism (3) incorporates some form of coupling between either the first or second arm and the third arm such that any movement of the third arm induces a movement in the first or second arm to which it is coupled.

9. A device according to Claim 8, *identifiable in that* the said coupling is arranged such that it gives the pick-ups' (2) mechanism (3) the ability to move the semiconductor wafer (11) in a direction at right angles to the plane of the aperture.

10. A device according to any of Claims 7 to 9, *identifiable in that* the said first (6), second (7) and third (8) arms lie in a plane approximately parallel to the plane of the aperture in the said initial position for the first and second arms and along the upper edge (69) of the shutter (1).

11. A device according to Claim 10, *identifiable in that* the said first (6), second (7) and third (8) arms are additionally arranged, when in the said initial position for the first and second arms, within a defined space (63) lying between the two planes (64, 65) of the two external (25, 26) surfaces of the shutter respectively.

12. A device according to Claims 4, 8, and 10 or 11, *identifiable in that* it incorporates some automatic means of deploying (27) whichever of the said first (6) or second (7) arms is not coupled to the third arm (8) by the said coupling, in order to change from the initial to the second moving arm position when the said third arm moves outside the plane parallel to the plane of the aperture.

13. A device according to Claim 12, *identifiable in that* the said automatic deployment system incorporates a return spring (27) in its compressed state when in the initial position of the first (6) and second (7) arms.

14. A device according to any of Claims 2 to 13, *identifiable in that* the said means of orientation (20) incorporates a rotary drive friction roller (30) acting on the rim (19) of the said semi-conductor wafer(s) (11).

15. A device according to Claim 14, *identifiable in that* the said drive roller (30) is integral with the shutter (1), and in that the device incorporates some means of moving (31) the said drive roller between at least two positions, the one referred to as the 'active' position in which the roller protrudes and may drive the semi-conductor wafer in rotation and the other in which the said roller is at least partially retracted to allow movement of the pick-ups' (2) mechanism (3) from the first side (15) of the shutter to the second side (17) and back again.

16. A device according to any of Claims 4 to 15, *identifiable in that* it incorporates some means of arresting (35) the pick-ups' (2) mechanism (3) and the said pick-ups in the initial moving arm position.

17. A device according to Claims 14 and 16, *identifiable in that* the said arresting system (35) for the pick-ups' (2) mechanism (3) and the pick-ups is coupled with the mechanism (31) of the drive roller (30) used to rotate the rim (19) of the semi-conductor wafer(s) such that the movement of the drive roller causes the movement of the arresting system.

18. A device according to any of Claims 1 to 17, *identifiable in that* it incorporates some form of sensor equipment (44, 46) to detect the position of a semi-conductor wafer (11) within its container (14), and also incorporates some means of measuring the thickness of the semi-conductor wafer.